UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/963,485	09/27/2001	Norihiko Sekine	011292	9317

23850 7590 09/29/2003

ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP
1725 K STREET, NW
SUITE 1000
WASHINGTON, DC 20006

EXAMINER	
KANG, DONGHEE	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 09/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/963,485	SEKINE, NORIHIKO	
	Examiner	Art Unit	
	Donghee Kang	2811	

-- Th MAILING DATE of this communication app ars on th cover sh et with the corr spondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *7-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 14-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Remarks

1. Applicant's Amendment and Response to Paper No.6 have been entered and made of Record. New claims 14-19 have been added. Thus, claims 1-19 are pending in this application. Claims 7-13, non-elected invention, are withdrawn from further consideration.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **14-15** are rejected under 35 U.S.C. 102(b) as being anticipated by Itaya et al. (US 5,780,873).

Re claim **14**, Itaya et al. teach a semiconductor device comprising (Fig.6):

a first (GaN-based light-emitting device structure section, 117-111) and second (GaAs,118) semiconductor substrates, both being different in lattice constant and bonded with each other(Col.12, lines 9-10), wherein an amorphous layer (119) made of constituent atoms of said first and second semiconductor substrates (Col.12, lines 7-9) and formed at an interface between said first and second semiconductor substrates. *See also Col.10, lines 43-Col.12, line 29.*

Itaya et al. do not explicitly teach the amorphous layer has a linear current-voltage characteristic. However, this feature is inherent in Itaya's device because Ihe structure of Itaya is identical with the claimed structure.

Regarding claim **15**, Itaya et al. teach said first and second semiconductor substrate including a light-emitting layer (113; Col.10, lines 50-51).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims **1-6 & 16-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Itaya et al. (US 5,780,873) in view of Piprek et al. ("Abrupt self-switching in fused GaAs/InP vertical-cavity lasers", CELO'99, pp. 458).

Re claims **1, 3 & 16**, Itaya et al. teach a semiconductor device comprising (Fig.6):

a first semiconductor substrate (GaN-based light-emitting device structure section, 117-111); a second semiconductor substrate (GaAs,118), both being different in lattice constant, and bonded with each other, (Col.12, lines 9-10),; and an amorphous layer (119) made of constituent atoms of said first and second semiconductor substrates (Col.12, lines 7-9) and formed at an interface between said first and second semiconductor substrates. *See also Col.10, lines 43-Col.12, line 29.*

Itaya et al. do not teach the first semiconductor substrate being an InP substrate.

Long-wavelength lasers are very attractive owing to their application in optical communication systems and InP-based semiconductor material is conventionally used as an active layer in vertical-cavity surface emitting lasers to obtain long emission wavelength. Piprek et al. teach forming vertical-cavity lasers with long emission wavelength using InP-based light emitting structure on GaAs substrate (See Fig.2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute GaN-based light emitting structure in Itaya's device with InP-based light emitting structure as taught by Piprek to make a long wavelength laser, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

Re claim **2**, Itaya et al. teach said first and second semiconductor substrates including a light-emitting layer (113; Col.10, lines 50-51).

Re claims **4 & 17**, Itaya et al. do not teach the first semiconductor substrate including a compound semiconductor layer made of InGaAsP. InGaAsP is conventionally used as an active layer in InP based light emitting structure and also Piprek et al. teach InGaAsP MQW between InP cladding layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the active layer using InGaAsP MQW in InP-based light emitting structure, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

Re claims **5 & 18**, Itaya et al. do not teach said second semiconductor substrate including a compound semiconductor layer, which is made of $Al_xGa_{1-x}As$ (x is a number from zero to one). Piorek et al. teach the second semiconductor substrate (GaAs) including GaAs/AlAs DBR to obtain resonant cavity structure. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form GaAs/AlAs DBR in Itaya's device, since the GaAs/AlAs DBR can decrease an optical loss, hence increasing light intensity.

Re claim **6**, Itaya et al. do not expressly teach the amorphous layer having a thickness of 1 nm or more. However, Itaya et al. teach the amorphous layer having a thickness of about 10 nm, which is in the range claimed by the applicant (Col.10, lines 58-59). It is an obvious matter of routine experimentation to find the optimal thickness range. Generally, differences in thickness will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such thickness is critical. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the amorphous layer having a thickness of 1 nm or more, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

6. Claim **19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Itaya et al. (US 5,780,873).

Itaya et al. do not expressly teach the amorphous layer having a thickness of 1 nm or more. However, Itaya et al. teach the amorphous layer having a thickness of about 10 nm, which is in the range claimed by the applicant (Col.10, lines 58-59). It is an obvious matter of routine experimentation to find the optimal thickness range. Generally, differences in thickness will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such thickness is critical. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the amorphous layer having a thickness of 1 nm or more, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

7. Applicant's arguments filed July 14, 2003 have been fully considered but they are not persuasive.

Applicant argues that Itaya et al. fail to teach the substrate has an electric conductivity. This is not convincing. The substrate of Itaya would have a same electric conductivity with the claimed substrate because both substrates have the same structure.

Applicant argues that Itaya et al. fail to teach that the relationship between the amorphous layer and the linear current-voltage characteristic is based on experimental results of GaAs and InP. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which

applicant relies (i.e., the relationship between the amorphous layer and the linear current-voltage characteristic is based on experimental results of GaAs and InP.In) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Tom Thomas

dhk

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800